

Science Flight Report

Operation IceBridge Antarctica 2010



Flight: F10
Mission: PIG Arch

Flight Report Summary

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| Aircraft | DC-8 (N817NA) |
| Flight Number | 110115 |
| Flight Request | 118003 |
| Date | Saturday, November 20, 2010 (Z), Day of Year 324 |
| Purpose of Flight | Operation IceBridge Mission PIG Arch |
| Take off time | 15:01:32 Zulu from Punta Arenas (SCCI) |
| Landing time | 02:01:29 Zulu at Punta Arenas (SCCI) on Sunday, November 21, 2010 |
| Flight Hours | 11.1 |
| Aircraft Status | Airworthy. |
| Sensor Status | All installed sensors operational. |
| Significant Issues | None |
| Accomplishments | <ul style="list-style-type: none"> • Low-altitude survey (1,500 ft AGL) of Pine Island Glacier tributaries. • Completed entire mission as planned. • ATM, MCoRDS, Snow and Ku-band radars, gravimeter, LVIS, POS/AV, and DMS were operated on the survey lines. • Conducted a ramp pass at Punta Arenas airport for ATM instrument calibration (1,000 ft AGL). Unusable due to snow storm. |
| Geographic Keywords | Antarctica, Pine Island Glacier. |
| ICESat/CryoSat Track | ICESat tracks 0094,0130,0249,0213,0332,0368,1350,1314 |
| Repeat Mission | None |

Science Data Report Summary

| Instrument | Instrument Operational | | | Data Volume | Instrument Issues |
|---------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------|-------------------|
| | Survey Area | Entire Flight | High-alt. Transit | | |
| ATM | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 52 GB | None |
| MCoRDS | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 TB | None |
| Snow Radar | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 230 GB | None |
| Ku-band Radar | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 230 GB | None |
| LVIS | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 80 GB | None |
| DMS | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 70 GB | None |
| POS/AV (510 + 610) | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 2 GB | None |
| Gravimeter | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 80 MB | None |
| DC-8 Onboard Data | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 40 MB | None. |

Mission Report (Michael Studinger, Mission Scientist)

The AMPS model for today showed the Pine Island area as the only remaining target with suitable conditions. The AMPS model did not show any clouds in the area, but we have experienced scattered low clouds and high clouds during yesterday's flight in the area when the AMPS model did not show clouds either. The GFS model that we get during the weather briefings at the airport predicted the low and high clouds, which were also visible on the MODIS image and IR images. We had to choose between two missions this morning: PIG Arch and LVIS PIG, which have been both rated high. The weather made the decision for us. High clouds were visible in the MODIS, predicted by the GFS model during the weather brief and with a few scattered clouds at low elevation the logic choice was to stay below the clouds. The GFS forecast and MODIS image worked out well and we saw most of the LVIS PIG area under a significant cloud cover that would likely have resulted in a significant loss of data in a high altitude mission (see Fig. 1). The low-altitude mission worked out well and we only lost some ATM data on a short segment between waypoints HS30 and HS31. LVIS was still tracking the surface in profiling mode.

The PIG Arch mission is a new design. It is intended to provide measurements of ice thickness and surface elevation beyond that provided by previous Pine Island Glacier IceBridge flights, primarily to sample the numerous tributaries feeding into the main Pine Island Glacier trunk. The inland arcs are aligned along ICESat tracks 0094, 0130, 0249, 0213, 0332, 0368, 1350, and 1314.

We also crossed yesterday's line along a CryoSat-2 orbit four times during today's flight. This will provide an opportunity to look at cross-over errors and cross slopes. There was no precipitation since yesterday and very little wind which should provide a good basis for comparison.

The ice surface in the Pine Island Area is much smoother than last year and many crevasses are filled with snow. It appears that precipitation from the recent series of low-pressure systems that have prevented us from flying has the potential to cause an outlier in dh/dt measurements this year.

All instruments worked well and we recorded good data on this flight. In addition to the survey lines we were able to collect brief segments of LVIS and DMS data over small cloud free areas over sea ice in the Bellingshausen and Amundsen Seas.

Individual instrument reports from experimenters on board the aircraft:

ATM: Both ATM system worked well and collected good data along the entire survey line, except for a small patch of ice fog.

MCoRDS: The MCoRDS radar worked well and collected 1 TB of data.

Snow and Ku-band radar: Both systems worked very well.

Gravimeter: Worked well. No issues.

DMS: DMS worked well.

LVIS: The LVIS system worked very well. No issues.

POS/AV: Systems worked well. No issues.

DC-8 on board data: Worked well. No issues.



Figure 1: View towards the LVIS PIG survey area showing high clouds. Picture was taken around 21:40 Z between waypoints 135001 and 135002.

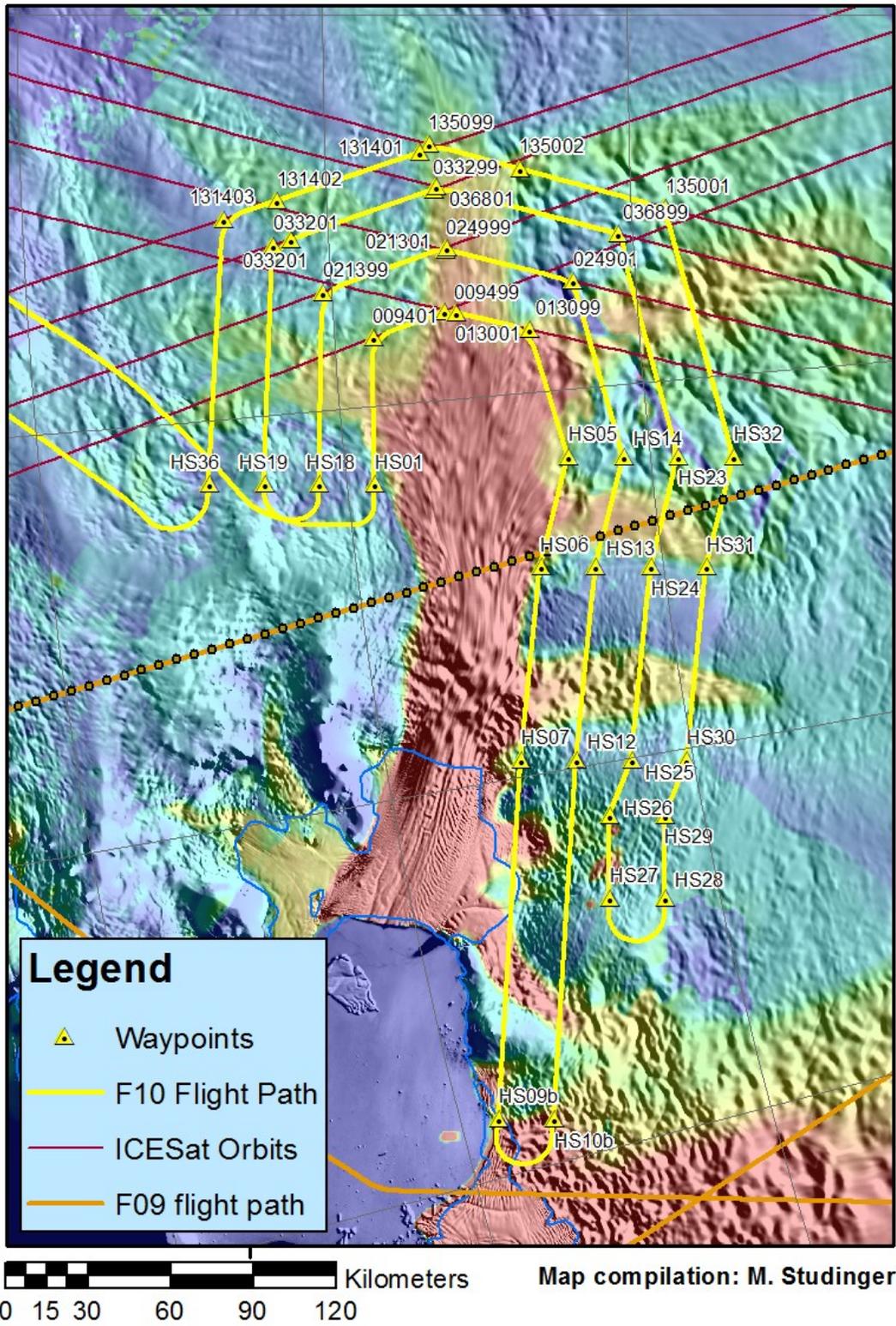


Figure 2: Flight path of today's mission PIG Arch. Basemap shows InSAR velocities from Eric Rignot and MODIS image.